

KLINGLE ROAD VALLEY

STORM WATER MANAGEMENT PLAN METHODOLOGY

The Contractor will prepare a Storm Water Management Plan for the Klingle Road Study Area. The plan will be prepared pursuant to approved NEPA, CEQ and FHWA guidance.

The scope of work is for conducting water resources planning services for the Washington, D.C. District Department of Transportation (DDOT). This analysis is deemed necessary in response to public concerns regarding the impact of the proposed action on storm water runoff. The proposed study is to look at required storm water management measures to support the repair and restoration of Klingle Road for vehicular and recreational uses. The proposed study will support development of a proposed project description and an analysis of the impacts of the proposed project and the no-build alternative in a future NEPA document.

To identify and evaluate the potential impacts of storm water on Klingle Creek first requires estimating the volume of runoff generated in the watershed and the routing of this runoff through the existing storm sewer system and the stream network in the watershed (Please refer to the separately attached map). Potential for bank erosion for the alternatives will be assessed at various locations in Klingle Creek. The study will culminate in the development and evaluation of a storm water management plan for the project alternatives.

The scope of services and major methodologies that would be used to meet the objectives of this study were developed by the Tasks outlined below.

Analysis Procedures

- Characterization and delineation of Klingle Creek watershed. The identification of the Klingle Creek watershed boundaries will be based on maps provided by the DDOT and WASA. The Klingle Creek watershed will be delineated into several basins smaller in size to simplify the simulation of runoff and identification of potential problem areas. The boundaries of these basins are based on the topographic features of the watershed.
- Characterization of land use conditions. The existing land use conditions in Klingle Creek watershed will be identified and characterized based on available GIS land use/land cover data and recent aerial photography of the watershed. Maps of both data types will be developed and overlaid to check for quality and accuracy.
- Characterization of the Klingle Creek channel and the bank condition. A field assessment of Klingle Creek will be conducted to determine the channel type and estimate the length, slope, width, and depth. Field observations will be made on the conditions of the channel bed and the stream bank stability.
- Identification of existing sewer infrastructure within Klingle Creek watershed. The Klingle Creek watershed is located within an urban area that is served by sanitary and

storm sewers. The general alignment of the existing sewer systems will be identified and mapped based on the available maps of the study area.

- Identification of storm drain outfalls and existing problems in the storm water conveyance system. Storm water outfalls discharging storm runoff to the Klinge Creek watershed will be identified based on maps provided from DPW and the areas of the watershed contributing this runoff will be identified from drainage maps and field observations.
- Development of a HEC-1 model of the watershed. Using the HEC-1 model to estimate the quantity of the runoff from the watershed and in Klinge Creek Valley, the storm runoff will be routed through the existing storm sewer system and the stream network.
- Development and evaluation of potential alternatives. Estimate velocities for the predicted flows and stream cross-sections at selected locations. Develop solutions will provide a basis for estimating differences in the potential for stream bank degradation.

TASKS

Detailed tasks to complete the hydraulic analysis and storm water study include:

1. Gather and review data and information for study area.

Previous reports or studies conducted in the Klinge Creek or Rock Creek watershed will be reviewed and considered. Data and information published in reports such as the following are of great importance where relevant.

- *Rock Creek Watershed Conservation Study*
- *District of Columbia Municipal regulations*
- *Infiltration/ Inflow Analysis Rock Creek Sewer System Drainage Basin*
- *Infiltration/ Inflow Analysis Drainage Area No. 3*
- *Effects of Urban Development on Floods in Northern Virginia*
- *Effects of Urbanization on Stream flow and Sediment Transport in the Rock Creek Park and Anacostia River Basins*
- *Channel Profile*
- *Existing Road Profile*

2. Watershed delineation and land use characterization.

The limits of the Klinge Creek watershed will be based on the 1991 National Capital Planning Commission 1991 topographic maps of the District of Columbia at 1:2400 scale. The land use conditions will be based on data obtained from the DDOT in conjunction with other local and federal agencies and verified through visual field observation.

3. Characterization of the Klinge Creek channel and bank conditions.

Assessment of the existing Klinge Creek channel and bank conditions will be based on visual stream assessment. The visual assessment will include the items listed below and the problem areas will be identified and mapped.

- Channel conditions (geomorphology)
- Bank stability and vegetative protection
- Riparian conditions
- Stream habitat diversity
- Riffle frequency and embeddedness in run areas (high gradient streams)
- Pool variability (low gradient streams)
- Substrate
- General water quality characteristics
- Evidence of dumping, debris and illicit discharges
- Obstructions to flow
- Position of pipes and drainage ditches
- Storm drain outfalls and ponds
- Location and conditions of road crossings
- Location of utility lines

4. Identification of the storm sewer system infrastructure in Klinge Creek watershed.

Identification of the trunk line into which the sewer collectors discharge will be based on review of maps from Water and Sewer Authority (WASA). The sewer line will be digitized and included in the GIS model of the Klinge Creek watershed. The existing storm pipes will be evaluated using measures such as smoke testing, and/or televising the lines.

5. HEC Model development.

Input files for the Hydrologic Engineering Center Model (HEC-1) will be developed. The model will be used to process rainfall data and to generate hydrographs based on the rainfall data and the watershed characteristics. This model will provide the volume and velocity of flow at all the contributing sub areas. The HEC-RAS (River Analysis System) model will then be utilized to develop water profiles within the creek and to perform scour analysis and sediment transport analysis. The HEC-1 and HEC-RAS models will be calibrated based on historical stream flow data from a representative stream flow gage.

6. Development and evaluation of proposed storm water management alternatives.

The storm water runoff will be routed through the existing storm and the stream network. Runoff volumes and velocities will be evaluated for the 1-year, 10-year and 25-year design storms. Alternative solutions will be developed to minimize the flooding and erosion that is occurring in the Klinge Creek valley. These alternatives will also be designed to improve water quality by reducing the scouring that is occurring within Klinge Creek without negatively impacting the downstream water body, Rock Creek.

Alternatives to be developed will include:

- routing portions of the storm water flow entering the valley around Klingle Creek to Rock Creek,
- slowing the velocity of flow at the storm water outfalls,
- detention and/or retention of storm water within the valley or surrounding area, and
- slowing the velocity of flow in Klingle Creek via an engineered structure.

All alternatives to be developed will include proper outlet protection at outfalls to prevent scour and erosion. All culverts and pipes will be analyzed based on the design storm required by Federal and local regulations.

The stormwater management plan alternatives will be evaluated for the

- No build alternative
- Bikeway alternative

7. Meetings and Coordination/Preparing Deliverables

This project will start with a Kick-Off meeting between the Berger project manager and key staff at DDOT. Ongoing coordination meetings (up to three) with key DDOT staff will occur throughout the duration of the project. This task also includes the final preparation of deliverables:

Deliverables

The deliverable will be in a form of a report that will include:

- The results of the stream visual assessment
- GIS maps showing the following layers
 - Delineated Klingle Creek watershed
 - Location of storm sewer system infrastructure
 - Stormwater conveyance system problem areas
 - Location of the proposed structures to mitigate the impacts of the stormwater
- HEC1 and HEC-RAS input files and results
- Stormwater management alternatives. This includes concept drawings of engineered structures location and sizes based on the design storms.